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CH-37

ACCIDENT SUMMARY

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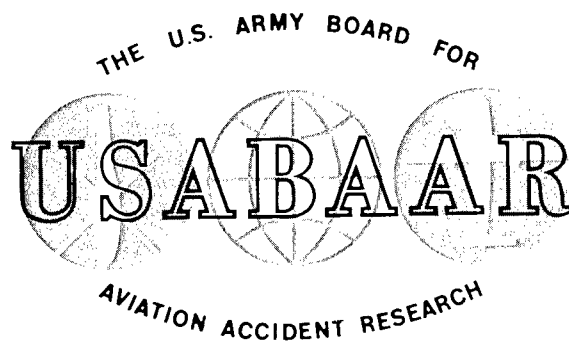
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CH-37 ACCIDENT SUMMARY

1 July 1957 through 30 November 1966

by
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Investigation and Engineering Division
Engineering Branch



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Director

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CH-37 ACCIDENT SUMMARY

JULY 1957 THROUGH NOVEMBER 1966

SUMMARY:

This report is a review of CH-37 accidents, incidents, forced landings, and precautionary landings during the period July 1957 through November 1966.

During this period, there were 264 mishaps reported. Of these, 29 were major accidents and four were minor accidents. There were 47 incidents, 89 forced landings, and 95 precautionary landings.

Review of the major accidents indicated that pilot factors accounted for 48.3% of the major accidents, while materiel failures or malfunctions were responsible for 37.9%. Weather, supervision, and maintenance were responsible for the remaining 13.8%.

Selected briefs of mishaps and cause factors are included to illustrate types of mishaps which occurred during this period. Each brief is preceded by a USABAAR log number so that queries may be directed to USABAAR if additional information is desired.

It will be noted that many incidents, forced landings, and precautionary landings are recorded in this summary with cause factors not reported. This results from reporting units failing to provide supplemental information as it becomes available. Reports of this nature, without supplemental data, are of little use to the aviation safety program and all units reporting similar mishaps are urged to follow through with supplemental data as soon as it becomes available.

This accident summary should be of particular interest to commanders and personnel of National Guard and reserve units now employing CH-37 equipment.

Selected Major Accident Briefs

57072101—While on final approach, a loud noise was heard at approximately 75 feet, followed by a vibration in the cyclic control. At approximately four feet, another loud noise was heard and control was lost. CAUSE: Fatigue failure of one main rotor blade. Blade weight or portion of blade struck tail rotor, resulting in loss of control.

00578—During a practice demonstration, the helicopter landed and the pilot was instructed to take off again. At approximately 50 feet, the helicopter began to lose altitude. The main rotor blades struck a tree 240 feet from the point of takeoff. One fatality and two injuries resulted. CAUSES: (1) Pilot was

directed to take off downwind over barriers to make a better showing for the demonstration; (2) Weight and balance were not computed before flight; (3) Helicopter exceeded allowable gross weight by 1,867 pounds; (4) Density altitude was not computed.

00658—The helicopter was hovering over an Honest John Rocket while the hook-up crew secured the rocket. The hook was not working properly, so the helicopter was landed. The pilot was then directed to hover over the rocket again for another hook-up attempt. The hook locked this time and the pilot picked the load up to a hover. The pilot began hovering forward, maintaining rpm and altitude. At the edge of the hardtop, the helicopter began to sink. The pilot attempted to flare and drop the load. The load did not release and the rocket hit the ground, bouncing up and hitting the bottom of the helicopter. The swing of the rocket increased the forward speed, carrying the helicopter out into the sand dunes, and it came to rest on the rocket. CAUSES: (1) Pilot misjudged altitude; (2) Sling hook did not release; (3) Wind, light and variable prior to takeoff, was tailwind at time of accident. CONTRIBUTING FACTORS: (1) Pilot lacked experience in high altitude and desert operations; (2) Pilot did not check maximum power before takeoff; (3) Flight engineer did not tell pilot he was too low for takeoff.

01700—After engine shutdown, following completion of night cross-country training flight, the pilot was instructed to move the helicopter off the ramp and park on a sod area approximately 100 feet away. The pilot restarted the No. 1 engine and was attempting to restart No. 2 engine when a metal-striking-metal sound was heard. No. 1 engine oversped, causing the engine fan to fail, throwing all fan blades and resulting in major damage to fuselage. CAUSE: Copilot inadvertently pushed the No. 1 overhead throttle forward to full open position while advancing the mixture control lever for No. 2 engine.

01755—Helicopter was on approach. As it came within approximately 10 feet of the ground, instantaneous violent vibrations occurred. The main transmission separated and the No. 1 engine began to burn. Fire spread to the fuselage, completely destroying the helicopter. One serious injury resulted. CAUSE: Failure of main rotor blade.

02044—Helicopter sustained major damage as it was taxied into parking position with the aid of a ground guide. Tail rotor hit ten-foot maintenance stand located approximately eight feet from the edge of a hardstand ramp. CAUSE: Insufficient clearance between tail rotor and maintenance stand.

02221—Aircraft crashed and burned. Pilot, co-

pilot, and three other crewmembers killed. Weather at the time of the accident was 400 feet broken, 1,000 feet overcast, and five miles visibility with fog. CAUSE: The cause of this accident was listed as undetermined as there were no witnesses or survivors. Suspect disorientation and weather were contributing factors.

02487—Nose doors opened during go-around from confined area. Wind pressure forced doors against bulkhead and left door was torn from helicopter, causing major damage to support member. CAUSE: Nose door control lever was inadvertently actuated, causing nose doors to open.

03403—Aircraft was taxiing in front of a line of parked CH-37's. Main rotor blades struck rotor blades of parked helicopter. Major damage to main rotor blades of taxiing helicopter. CAUSE: Insufficient clearance between taxiing and parked helicopters. Instructor pilot allowed pilot to taxi too close to a parked helicopter.

03822—Loss of power occurred shortly after takeoff and helicopter settled into trees. Major damage to all main rotor blades, both main landing gear, and right side of fuselage. CAUSE: Approach was terminated short of selected area. Improper technique in application of throttle and collective pitch caused loss of rpm.

03824—Loss of power occurred shortly after take-

off and helicopter settled into trees. Major damage to main rotor blades, right stabilizer, and right gear hydraulic lines. CAUSE: Pilot failed to compute allowable gross weight and failed to use available open space for takeoff.

04318—Right main gear hit soft spot in sod, digging in approximately one foot. Aircraft moved forward and came to rest on right auxiliary tank and right bottom side of fuselage. CAUSE: Landing gear down lock pin sheared during running landing due to soft spot.

04537—Left landing gear collapsed during landing touchdown. Major damage to left clamshell door, landing gear, auxiliary fuel tank, engine nacelle, and fuselage. CAUSE: Misalignment of drag link assembly, causing excessive wear at the hinge point.

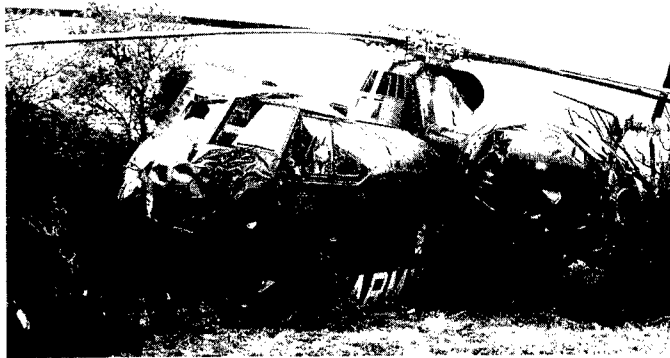
04603—Helicopter lost altitude abruptly, following maximum performance takeoff, and settled into trees. Major damage to main rotor blades, tail rotor blades, landing gear, clamshell doors, engine and nacelles and fuselage. CAUSE: Shifting, gusty wind and downdraft, which the pilot did not anticipate prior to takeoff.

04608—Noise was heard as helicopter landed. Investigation revealed tail wheel assembly had collapsed. CAUSE: Low tail wheel strut condition, combined with the wave action of touching down on

00658



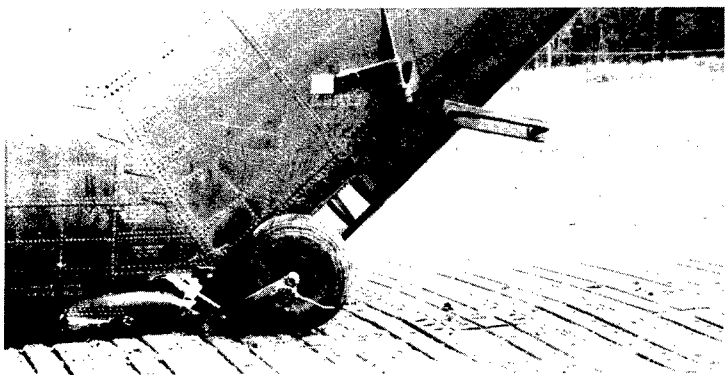
04603



04318



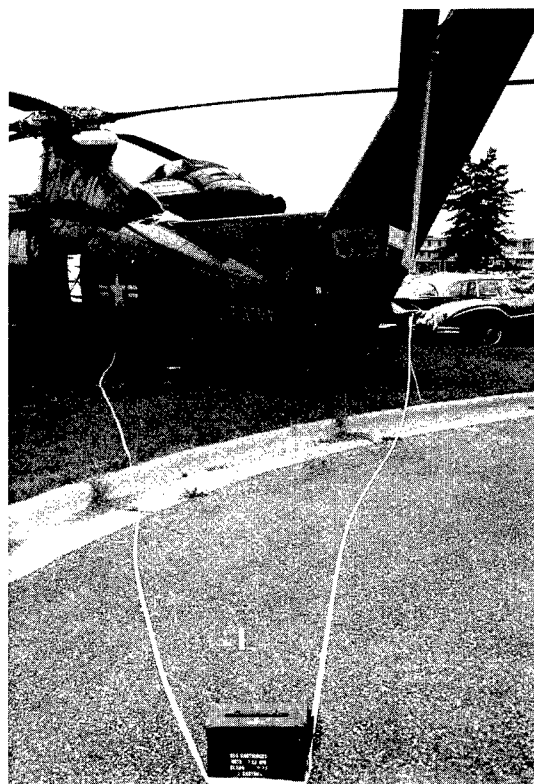
00578



04608



04918



A117

PSP, caused tail wheel yoke to hit ground. It was determined that the liquid spring failed due to the loss of hydraulic fluid from the strut which occurred during one of four previous landings.

04918—Helicopter settled during low reconnaissance of a landing site and crashed on 7,000 foot mountainous terrain. CAUSES: (1) Inadvertent slowing of helicopter while searching terrain for landing area, resulting in loss of translational lift; (2) Build-up of excessive rate of descent with insufficient available power to cushion landing; and (3) Concentration of search for landing site by both pilots, resulting in diversion of attention.

05890—During single engine, minimum roll, landing, main rotor flexed into the aft pylon. CAUSE: Hard landing.

05914—Helicopter was returning to home station when it assumed a nose high attitude which was attributed to turbulence. Prior to nose high attitude, the pilot removed his hand from the collective pitch stick to adjust the radio. The pilot lowered collective and applied forward cyclic to level the helicopter. Simultaneously, a strange sound was heard. Inspection revealed antenna above pilot's compartment missing. Paint deposits and damage of two rotor blades indicated rotor blades struck antenna in flight. CAUSES: (1) Rapid movement of the collective pitch control and cyclic control by the copilot during the recovery from a nose high attitude; (2) Lack of clearance between main rotor blades and

antenna due to non-compliance of TM1-1H-37A-1072.

05927—Loud noise was heard from transmission, followed by loss of rotor rpm. Autorotation was started and pilot attempted to use power for landing. Rotor rpm could not be maintained and helicopter settled into rice paddy dike. Major damage to clamshell doors, right landing gear, and tail gear. CAUSE: Failure of gears in main transmission.

06155—Helicopter was making an approach to a mountain helipad when it suddenly started to sink approximately 25 feet above and 60 feet short of the desired touchdown spot. Pilot and copilot applied full power and managed to slow the sink rate so that the main gear was placed on the helipad, but short of the desired spot. The helicopter continued forward and downward, with the underside dragging on the curb of helipad. The pilot then brought the helicopter to a hover and landed safely. CAUSE: Failure to evaluate wind conditions in the vicinity of the helipad and to anticipate the possibility of sudden changes in wind direction and velocity.

06742—Helicopter flew into downdraft 15 feet above and 25 feet short of the desired touchdown spot during approach to mountain helipad. The pilot applied power and stopped the sink rate, but the tail wheel strut hit the edge of the concrete helipad. The helicopter continued forward and the tail wheel strut assembly was pulled loose from its attaching point. CAUSE: Failure to evaluate wind in the vicinity of the helipad.



06742



A284

07130—Helicopter settled to ground 100 feet short of mountain pad. Major damage to main rotor blades, engine diffuser, mixing tube, engine nacelle, and main rotor head. CAUSE: Pilot misjudged distance and allowed rpm to decrease.

07792—Tail rotor failed while helicopter was sling loading CH-21 fuselage. Prior to shutdown, the main rotor blades struck the CH-21, causing major damage to rotor blades and power train. CAUSES: Failure of tail rotor hub bearings (FSN 1560-629-8716) and malfunction of hook assembly.

A117—After takeoff, the No. 1 engine began to lose power. The helicopter failed to develop sufficient airspeed and altitude to clear wires across the flight path. Pilot attempted to abort takeoff and land. Helicopter settled through the wires and struck a curb, causing major damage to the tail wheel and pylon section. CAUSES: Engines failed to develop sufficient power for takeoff due to prolonged operation at ground idle which resulted in fouled plugs. Pilot selected takeoff flight path obstructed by wires and parked automobiles.

A284—Helicopter approached a mountain helipad (altitude 3,800 feet) with a sling load of three telephone poles. Approximately 60 feet short of the helipad, a loss of lift occurred and the sling load was dropped. The pilot attempted to fly over the crest of the mountain and the helicopter struck a rocky ledge on the tail pylon, at a point approximately four feet forward of the tail wheel. As the



C796

helicopter continued down the north slope of the mountain, the tail pylon separated from the fuselage and control was lost. The helicopter crashed and the auxiliary fuel tanks ruptured. The aircraft burned and five occupants were killed. CAUSE: Loss of lift during final stages of the approach, coupled with high density altitude and near maximum gross weight condition.

A570—After approximately 20 minutes of flight, the helicopter made a violent uncontrollable left turn and pitched up. Simultaneously, it developed a severe lateral vibration. The copilot reduced collective pitch and established a power-on autorotative descent. The main landing gear was left in the retract position and little or no collective pitch was applied to cushion the impact. CAUSES: (1) Loss of antitorque control, due to failure of the flight control support assembly, coming loose from its attaching point. This was caused by improper torque on the retaining bolts. (2) Failure to use standard emergency procedures.

B036—Returning from a recovery flight, the helicopter had a UH-1B suspended from the external cargo hook. At the destination, the cargo hook malfunctioned and would not release. A manual release was successful. However, the cables became entangled with the UH-1B. Before they could be untangled, the No. 1 engine lost power and the CH-37 settled onto the UH-1B. CAUSES: (1) Loss of engine power due to fuel contamination. (2) Conflicting signals and instructions on ground in untangling cables from UH-1B.

C796—The helicopter hovered over a UH-1B and made a successful hook-up. The pilot increased rpm to 2800 and initiated the lift. RPM would not stabilize at 2800 and pilot set load back on the ground. Another try was made at 3000 rpm, but the rpm would not stabilize so the pilot immediately attempted to release the load and the cargo hook would not release. The helicopter was slowly descending and moving to the left when the mast of the UH-1B punctured the underside of the CH-37B fuselage. The flight engineer at this time activated the manual release. The helicopter came to rest alongside the UH-1B fuselage and on top of its tail boom. CAUSE: Malfunction of the electrical cargo hook release, due to lack of first echelon maintenance, and late activation of manual cargo release by flight engineer.

Selected Minor Accident Briefs

05480—Landing gear folded during landing on hard surface runway. CAUSE: Suspect malfunction of utility hydraulic system.

07911—Manifold pressure of No. 1 engine dropped to 22 inches in cruise flight. Altitude could not be maintained and helicopter was landed in rice paddy, damaging landing gear. CAUSE: Failure of No. 1 engine impeller clutch.

Selected Incident Briefs

02858—During attempt to move a 105mm howitzer for demonstration, the helicopter settled on the weapon. CAUSE: Turbulence caused by other helicopters operated in close proximity.

02878—Helicopter made maximum performance takeoff from confined area and settled over trees. Main rotor blades struck trees. Incident damage to five main rotor blades and right horizontal stabilizer. CAUSE: Not reported.

02913—Forced landing accomplished due to anti-torque failure. Tail wheel damaged. CAUSE: Not reported.

02997—Left ramp extension fell out as left clamshell door was closing. CAUSE: Door struck ramp, damaging nose cylinder mount bracket, and breaking hydraulic line.

03015—Main rotor blades struck tree during strip approach. Five main rotor blade tip caps damaged. CAUSE: Insufficient clearance.

03120—Clamshell doors closed on extended ramps after engine start. CAUSE: Not reported.

03166—Aircraft landed on stumps, punching three holes through fuselage bottom. CAUSE: Pilot was unaware of stumps in landing area.

03292—Cargo compartment filled with smoke and pilot detected odor of burning material. Helicopter was landed immediately and shut down. Main rotor blade droop stops were not given time to function properly. Blades dropped and caused incident skin damage to tail rotor pylon. CAUSE: Smoke and odor caused by rag in oil cooler which jammed pulleys.

03362—Tail rotor struck ground during practice autorotation. Incident damage to two tail rotor blades. CAUSE: Improper autorotation procedure.

03410—Right clamshell door swung open during takeoff. Door buckled and hinge torn. CAUSE: Broken hydraulic actuator mount.

04087—Left main landing gear collapsed during

practice single engine landing. Incident damage to down lock pin and actuating rod. CAUSE: Not reported.

04104—Helicopter landed on unknown object, rupturing fuselage bottom. Damage discovered during routine maintenance.

04313—Tail rotor struck runway during practice autorotation. CAUSE: Excessive flare.

04444—Upper half of rear cargo compartment door came off and went into tail rotor during practice night autorotation. Door destroyed and incident damage to tail rotor blades. CAUSE: Failure of door latch.

04664—Main rotor blades struck antenna. CAUSE: Crewchief inadvertently bumped switch with helmet, turning stick trim off and allowing cyclic to fall forward.

04871—Left clamshell door came open. Incident damage to door and escape hatch. CAUSE: Crewchief improperly secured door.

05029—Helicopter landed hard. Main rotor blades flexed into pylon, causing incident damage to blade caps and pylon skin. CAUSE: Pilot misjudged altitude and helicopter landed hard.

05638—Helicopter terminated pinnacle approach at a high hover. Pinnacle was not large enough to accommodate helicopter. Main gear was placed on pinnacle and unloading was accomplished without placing full weight of helicopter on ground. Helicopter evidently struck unknown object during this operation. Incident damage to two formers and three stringers found after flight.

05912—Helicopter struck tree during a shallow approach for night runway landing. Incident damage to nose door skin and stringer, auxiliary fuel tank and antenna mounts. CAUSE: Pilot misjudged altitude during shallow approach.

06754—Crewchief saw a hole in pylon after takeoff from a pinnacle helipad. No vibration or feel of blade striking pylon was noted by pilot. CAUSE: Not reported.

06937—No. 2 engine backfired and lost power. Right main gear sustained incident damage at touchdown, but No. 2 engine was restarted and aircraft was held at hover until load was discharged. Helicopter was flown to home field and No. 2 engine failed on final approach. CAUSE: Not reported.

07367—Main rotor blade struck windsock pole while helicopter was taxiing to parking area after landing. Rotor blade tip flew off and struck another aircraft, causing incident damage. CAUSE: Pilot taxied too close to windsock pole.

07618—Tail wheel dropped into depression during running landing on snow-covered hill. Incident damage to aft fuselage bulkheads and tail wheel support. CAUSE: Ground depression. Depression was not visible due to snow.

07888—Helicopter was following lead aircraft down taxiway lined on both sides with other aircraft.

Helicopter stopped when lead aircraft stopped and main rotor blade tip caps struck main rotor blades of parked UH-1B when power was reduced. Ground guide was used. CAUSE: Insufficient clearance.

08030—Tail wheel touched ground during demonstration of landing attitude. Main rotor blades flexed into base of pylon. Incident damage to blade tips and pylon. CAUSE: Failure to level helicopter prior to touchdown.

08380—Helicopter picked up sling loaded CH-34 to approximately 20 feet and hovered. Rotor rpm decayed and load was lowered to the ground and released. Helicopter continued to settle atop CH-34. RPM was recovered and helicopter lifted clear. Incident damage to fuselage bottom. CAUSE: Not reported.

08572—Flight engineer noted change in flight sounds and unusual noise from No. 1 engine. Precautionary landing was made and 10-inch hole was found in top rear edge of No. 1 engine nacelle. CAUSE: Failure of diffuser tube, which allowed exhaust gas to burn hole in nacelle.

A670—No. 1 engine failed in cruise flight at 400 feet. Altitude could not be maintained and helicopter was landed in corn field, collapsing gear in soft ground. Incident damage to main gear and underside of fuselage. CAUSE: Water in fuel system.

A985—Helicopter landed hard from practice autorotation. Incident damage to pylon, two main rotor blades and droop stop. CAUSE: Excessive aft cyclic.

B841—Ground reference was obscured at termination of approach by blowing snow. Helicopter landed with forward motion in deep snow, buckling left gear slightly aft. Incident damage to left gear drag link assembly and down-lock actuating cylinder. CAUSE: Loss of outside visual reference.

C674—Noise heard during landing on slight incline from hover at 4,500 foot helipad. Helicopter was lifted to remove weight from gear, then lowered and same noise was heard again. Two plexiglass panels over pilot's seat shattered. Incident damage to antenna, two plexiglass sections and adjacent formers. CAUSE: Not reported.

C891—Helicopter lost rotor rpm during attempt to clear barrier while sling loading damaged UH-1B. UH-1B was jettisoned and CH-37 settled to ground. Right drag link broke at impact and punctured firewall. Incident damage to right nose door, drag link and firewall. CAUSE: Not reported.

D360—Right forward cargo compartment window came off and struck manual release cables of auxiliary fuel tank, releasing tank from an altitude of approximately 500 feet. Window lost. Tank destroyed. CAUSE: Malfunction of window grommet.

D747—Main rotor blades flexed and struck tail pylon during landing. Damage and cause not reported.

E141—Helicopter landed in approximately three feet of snow with slight forward motion. Right main

gear struck small rise and collapsed. Incident damage to gear. CAUSE: Failure of right main landing gear drag link.

E830—Side window came off in flight and struck wires connected to auxiliary fuel tank, causing fuel tank to jettison. CAUSE: Not reported.

E935—Right outer wheel flange blew off while helicopter was taxiing. CAUSE: Failure of wheel assembly.

F261—Helicopter made precautionary landing because of loss of hydraulic fluid due to broken flange on utility hydraulic servo. System was repaired and helicopter took off, lost power and settled through top of tree. Tree ripped six-inch gash in clamshell door. Helicopter continued to fly and was landed without further damage. Altitude at site of incident was 6,000 feet and density altitude was 10,000 feet. CAUSE: Not reported. Suspect density altitude was contributing factor.

Selected Forced Landing Briefs

02616—No. 1 engine lost power during takeoff. CAUSE: Not reported.

03278—Bearing froze on pitch change shaft, resulting in complete antitorque failure. Forced landing completed with no damage. CAUSE: Not reported.

03468—No. 2 engine developed severe backfire during test flight. CAUSE: Not reported.

03552—Both engines began severe detonations and vibrations in flight and lost power. CAUSE: Suspect internal sand damage to engines resulting from desert operations.

03666—Loud explosion heard from No. 1 engine shortly after takeoff. Engine ran rough and backfired. CAUSE: Suspect contaminated fuel.

03694—No. 1 engine backfired through carburetor. CAUSE: Suspect fuel contamination.

03766—Tower operator saw smoke and fire coming from transmission deck cowling during takeoff. CAUSE: Smoke and fire caused by rag burning in oil cooler fan belts.

04326—Smoke was seen coming from the No. 2 engine. CAUSE: Oil leaking from nose section drain line onto exhaust stack.

04355—Pitch change hub bearing on tail rotor froze. CAUSE: Undetermined.

04452—Erratic control forces were experienced. CAUSE: Undetermined.

04463—Second stage servo pump failed. CAUSE: Failure of servo pump axial piston.

04486—No. 2 tail rotor drive shaft hanger bearing became hot. CAUSE: Shim in hanger bearing was found to be worn excessively.

04488—Scavenger oil line on No. 2 engine vibrated loose. CAUSE: Oil line was not properly secured.

04492—No. 2 engine failed after takeoff. CAUSE: Suspect impeller clutch failure.

04644—Manifold pressure decreased. CAUSE: Suspect failure of impeller clutch seal.

04995—Engine backfired, blowing off induction system screen and cowling. CAUSE: Failure of valve in No. 1 cylinder of No. 1 engine.

05028—Lower bearing of transmission oil cooler failed. CAUSE: Not reported.

05252—No. 2 engine cut out and backfired. CAUSE: Undetermined.

05533—No. 2 engine backfired and lost power. CAUSE: Broken intake valve, No. 4 cylinder.

05730—Manifold pressure needle for No. 1 engine fluctuated during approach to confined area. Crew-chief checked nacelle and reported diffuser had collapsed. Hole was blown in top of nacelle and smoke came from hole. CAUSE: Failure of diffuser assembly.

05738—No. 2 engine failed. CAUSE: Failure of No. 7 cylinder.

05793—No. 1 engine lost power. CAUSE: Impeller seal failure.

05796—Hydraulic leak seen in flight. CAUSE: Ruptured "O" ring seal in first stage hydraulic transmitter.

05797—No. 2 engine backfired continuously. CAUSE: Fouled spark plugs in No. 2 cylinder.

05848—Pressure of 3500 pounds was seen on first stage servo pressure gauge. CAUSE: Failure of first stage servo pump. Strato pump compensator spring allowed a full flow condition.

05861—Engine began misfiring and backfiring during takeoff. CAUSE: Cracked No. 13 cylinder. Five spark plugs found fouled.

05871—Helicopter on final approach with sling load had gradual loss of manifold pressure to 25 inches on No. 1 engine. Sling load was released. CAUSE: Suspect blown impeller seal.

05882—No. 2 engine backfired, followed by flash fire through oil cooler, and gray smoke from engine oil breathers and air outlet screens. CAUSE: Hole burned in piston head of No. 8 cylinder and broken rings.

05918—No. 2 engine lost power. Manifold pressure dropped from 35" to 22". CAUSE: Impeller seal failure.

05573—Main gear box failed. CAUSE: Undetermined.

05577—Transmission made unusual noise. Inspection revealed metal particles on transmission magnetic plug. CAUSE: Not reported.

05946—Unusual noise heard. Accumulation of metal particles found on main transmission magnetic plug. CAUSE: Internal failure of main transmission.

05986—Manifold pressure of No. 2 engine dropped from 44" to 39" during test flight following main

transmission installation. CAUSE: Blown impeller seal.

06030—Impeller seal failed during cruise flight. CAUSE: Not reported.

06044—No. 2 engine lost power and backfired. CAUSE: Loose spark plug.

06176—No. 2 engine manifold pressure dropped from 35" to 22". CAUSE: Blown impeller seal.

06209—No. 2 engine manifold pressure dropped from 45" to 40" at hover during test flight. CAUSE: Blown impeller seal.

06267—No. 1 engine backfired and detonated. CAUSE: Suspect cracked cylinder. No additional information reported.

06327—No. 1 engine over-revved to approximately 4000 rpm. CAUSE: Clutch failure.

06366—A rapid increase in No. 1 engine oil temperature was noted. CAUSE: Burned mixing tube.

06383—No. 2 engine backfired and ran rough. CAUSE: Magneto slipped time.

06388—No. 1 engine lost power and manifold pressure fluctuated. CAUSE: Blown impeller seal.

06398—No. 1 engine oil temperature increased rapidly. CAUSE: Burned mixing tube.

06451—No. 2 engine over-revved during landing. RPM estimated above 4,000. CAUSE: Failure of free wheeling hydro clutch (FSN 1560-674-1857).

06452—No. 1 engine lost power during landing approach. CAUSE: Impeller clutch failure.

06479—Helicopter yawed to the left excessively. Medium frequency vibration felt through pedals. CAUSE: Tail rotor damper failure.

06600—No. 2 engine lost power during takeoff for test flight. CAUSE: Impeller clutch failure.

06682—Both engines failed during test flight autorotation. CAUSE: Not reported.

06648—No. 2 engine failed and No. 1 engine would not develop full power. CAUSE: Impeller clutch failure, No. 2 engine. Fouled spark plugs caused loss of power from No. 1 engine.

06687—No. 2 engine emitted excessive exhaust smoke. CAUSE: No. 7 cylinder found cracked.

06709—Smoke and sparks emitted from short shaft Thomas coupling. CAUSE: Malfunction of Thomas coupling. Reason not reported.

06755—Manifold pressure fluctuated and dropped from 45" to 32". CAUSE: Impeller clutch failure.

06760—Manifold pressure of No. 1 engine dropped from 37" to 22". CAUSE: Impeller clutch failure.

06792—Pilot heard grinding noise from engine accessory case area. CAUSE: Failure of engine output shaft.

06804—Main transmission failed. CAUSE: No further information reported.

06936—No. 2 engine lost power and failed. CAUSE: Not reported.

06977—No. 1 engine lost power after takeoff. CAUSE: Not reported.

07046—No. 1 engine manifold pressure dropped

from 36" to 25". CAUSE: Impeller clutch failure.

07152—No. 2 engine lost manifold pressure during takeoff. CAUSE: Suspect impeller seal failure.

07166—No. 2 engine oil pressure dropped after IFR departure. Helicopter made a missed approach at one airfield, diverted to another airfield, and landed. CAUSE: Failure of seal on free wheeling unit (hydromechanical clutch, FSN 1516-674-1857).

07212—No. 2 engine lost manifold pressure. CAUSE: Impeller seal failure.

07238—Drop in transmission oil pressure noted. After landing, oil pressure dropped to 10 pounds, with temperature at 120°C. CAUSE: Thermostatic valve in oil cooling system stuck in position that bypassed oil cooler and caused overheating.

07361—Sudden rise in transmission oil temperature noted in cruise flight approximately 10 minutes after takeoff. CAUSE: Failure of main gear box assembly.

08076—White smoke noted coming from No. 1 engine in cruise flight. CAUSE: Failure of engine oil line. Line ruptured.

A088—No. 1 engine backfired, failed, and caught fire in flight. Fire was extinguished with engine fire extinguisher. Altitude could not be maintained with No. 2 engine (gross weight 26,490 pounds). CAUSE: Suspect exhaust valve or piston failure.

A477—No. 1 engine backfired once and seized. CAUSE: Failure of No. 10 cylinder.

A971—Severe vibrations, shuddering, and loss of engine rpm reported. Copilot saw extensive sheet metal and clutch component damage in vicinity of No. 2 engine nacelle. Engine was shut down. CAUSE: Suspect clutch assembly failure.

B022—No. 1 engine manifold pressure fluctuated and dropped to 24" in cruise flight. No. 2 engine manifold pressure fluctuated 6-8 inches when additional power was added. CAUSE: Suspect impeller clutch failure.

B177—No. 2 engine began violent backfire and blew carburetor air intake screen off. CAUSE: No. 5 cylinder head found cracked.

B219—Transmission oil pressure dropped to zero. CAUSE: Not reported.

C158—Both engines surged and dropped several hundred rpm approximately two minutes after takeoff. No. 1 engine failed completely and No. 2 engine misfired and backfired. CAUSE: Water in fuel. Source of water unknown.

C203—No. 2 engine manifold pressure dropped to 22" during takeoff, before helicopter reached single engine airspeed and before clearing 60 foot barrier. Flight could not be maintained. CAUSE: Impeller clutch failure.

C270—No. 2 engine lost power at approximately 75 feet. Helicopter was carrying a 105mm howitzer externally, six passengers, and 150 pounds of internal cargo. Flight could not be maintained. Howitzer was released at touchdown. CAUSE: Impeller clutch failure.

C356—No. 1 engine impeller failed after takeoff. CAUSE: Not reported.

D613—Helicopter lost utility hydraulic pressure. CAUSE: Sheared hydraulic pump drive shaft.

D887—Pilot heard loud grinding noise and felt sharp severe vibration. CAUSE: Internal failure of main transmission.

Selected Precautionary Landing Briefs

07257—No. 1 engine lost power at hover. Engine was shut down and helicopter landed. CAUSE: Suspect impeller clutch failure.

07271—Sudden drop in transmission oil pressure noted. Warning light came on, but oil temperature remained in normal operating range. CAUSE: Malfunction of pressure transmitter (FSN 6620-553-8986).

07302—Loud noise and grinding sound heard. CAUSE: Suspect gear failure in main transmission. Abnormal metal particles found on magnetic plug.

07358—No. 2 engine failed. CAUSE: Suspect valve failure.

07387—No. 2 engine lost power at hover. CAUSE: Impeller clutch failure.

07421—Moderate feedback in tail rotor pedals felt by pilot. Light turbulence encountered immediately prior to feedback. CAUSE: Not reported.

07434—Manifold pressure of No. 1 engine dropped from 36" to 25" in flight. CAUSE: Impeller clutch failure.

07496—Manifold pressure of No. 1 engine dropped from 45" to 24" during takeoff. CAUSE: Suspect impeller seal failure.

07539—No. 2 engine ran rough. CAUSE: Not reported.

07554—Manifold pressure of No. 1 engine fluctuated and dropped from 40" to 24" during test flight. CAUSE: Impeller clutch failure.

07638—No. 2 engine lost power. CAUSE: Impeller seal failure.

07660—No. 2 engine failed. CAUSE: Suspect impeller seal failure.

07684—Transmission oil pressure dropped to 15 pounds and oil temperature rose 10° in flight. CAUSE: Dirty transmission oil seal and inadequate adjustment of oil pump pressure regulator.

07698—Loud noise was heard from main gear box assembly. CAUSE: Failure of accessory case of main gear box assembly (FSN 1560-676-5460).

07722—No. 1 engine manifold pressure dropped from 35" to 24". CAUSE: Impeller seal failure.

07729—High pressure hydraulic line in first stage servo ruptured. CAUSE: Failure of hydraulic line.

07732—No. 1 engine lost manifold pressure during takeoff. CAUSE: Impeller seal failure.

07740—No. 2 engine backfired and lost power. CAUSE: Incorrect carburetor adjustment.

07750—No. 2 engine manifold pressure dropped from 35" to 24". CAUSE: Suspect impeller seal failure.

07772—Transmission oil pressure dropped to zero and warning light came on. Metal particles and flakes of resin coating from main rotor gear box found clogging main gear box oil filter. CAUSE: Malfunction of bypass relief valve, causing loss of oil pressure.

08074—No. 1 engine backfired violently, smoked, and lost power. CAUSE: Not reported.

08075—No. 2 engine manifold pressure fluctuated and dropped to 24". CAUSE: Suspect impeller clutch failure.

08082—No. 2 engine manifold pressure fluctuated and dropped to 24". CAUSE: Impeller clutch failure.

08110—No. 2 engine started misfiring in flight. CAUSE: Fouled spark plugs in Nos. 3, 5, 7, 9, 12, and 14 cylinders.

08319—Servo hydraulic line failed. CAUSE: Unauthorized installation of low pressure hose in hydraulic servo line requiring high pressure hose.

08273—Helicopter yawed abruptly 20° right in cruise flight. Controls returned to normal after heavy pressure application. CAUSE: Suspect failure of tail rotor servo or ASE.

08487—Manifold pressure of No. 1 engine dropped from 35" to 24". CAUSE: Suspect impeller seal failure.

08502—No. 1 engine backfired. CAUSE: Left magneto malfunction.

08504—Transmission oil pressure dropped to zero in flight. CAUSE: Not reported.

08547—Violent movement of cyclic control occurred after takeoff with ASE on. CAUSE: Not reported.

08610—No. 1 engine backfired several times and needles split. Engine was shut down. CAUSE: Not reported.

08644—One engine backfired and ran rough in flight. CAUSE: Fouling of 18 spark plugs by excessive oil.

08646—No. 2 engine backfired and smoke was seen coming from nacelle. CAUSE: Piston ring failure, No. 8 cylinder.

A086—Main transmission oil leak noted in flight. CAUSE: Crack in oil pressure transmitter line at flare (pressure transmitter end).

A156—Pilot noted fluctuation of No. 2 engine manifold pressure during normal cruise flight. Helicopter was landed and No. 2 engine stopped. Exhaust manifold fire broke out when throttles were retarded. Pilot attempted unsuccessful engine restart and used emergency fire procedures to extinguish fire. CAUSE: Suspect malfunction of engine primer valve (FSN 2915-485-0341).

A243—No. 1 engine manifold pressure dropped to 22". CAUSE: Impeller clutch failure.

A258—No. 2 engine manifold pressure dropped to 27" for approximately 45 seconds in climb. High frequency vibration then started and became excessive during landing approach. Loud clanking noise heard from transmission as rotor was being stopped. CAUSE: Not reported.

A270—No. 2 engine manifold pressure fluctuated and dropped to 30" several times in climb. CAUSE: Suspect impeller clutch failure.

A435—No. 1 engine manifold pressure fluctuated and dropped to 29". CAUSE: Suspect impeller clutch failure.

A528—No. 2 engine lost power. CAUSE: Impeller clutch failure.

A537—No. 1 engine lost power. CAUSE: Impeller clutch failure.

A549—Pilot noted fire in No. 1 engine nacelle at 15 feet during landing approach, landed, and discharged No. 1 fire extinguisher. Fire was extinguished. CAUSE: Generator caught fire and burned wires.

A656—First stage servo pressure caution light came on and pressure dropped to zero at 1,500 feet. CAUSE: Failure of first stage servo pressure switch at point where manufacturer's nameplate was riveted to part.

A665—No. 1 engine lost power. CAUSE: Suspect impeller clutch failure.

A779—No. 1 engine lost power. CAUSE: Suspect failure of impeller clutch.

A814—Main transmission low oil pressure warning light came on at 1500 feet. Helicopter was landed on pasture. CAUSE: Internal paint of transmission flaked off and blocked oil screen.

A845—Low transmission oil pressure noted shortly after takeoff. CAUSE: Internal coating of transmission flaked off and clogged oil line.

A879—Crewchief detected hydraulic fluid leaking from ASE servo during takeoff. CAUSE: Not reported.

A900—No. 2 engine manifold pressure gauge fluctuated, causing surge and drop in rpm. CAUSE: Impeller failure.

B029—No. 2 engine misfired and lost power. Extreme vibration occurred when engine was reduced to idle rpm. Engine was shut down. CAUSE: Suspect fouled plugs and/or defective magneto.

B045—Transmission oil pressure lost. CAUSE: Suspect failure of transmission oil pump.

B060—No. 2 engine lost power. CAUSE: Main impeller seal failure.

B078—Transmission oil temperature approached red line. Helicopter was landed and erratic chattering noise was heard during shutdown. CAUSE: Not reported.

B158—Excessive transmission pressure noted in flight. CAUSE: Suspect servo hydraulic transmitter failure.

B175—No. 2 engine backfired, ran rough, and

leaked oil. CAUSE: Not reported.

B558—Manifold pressure for No. 2 engine dropped from 36 to 24 inches and smoke was noted coming from impeller case breather. Manifold pressure was held at 25" and helicopter was flown to airport and landed. CAUSE: Not reported.

B587—No. 2 engine oil pressure dropped below red line. Power was reduced to idle and helicopter returned to home airfield. Engine used 30 gallons of oil during three-hour flight. CAUSE: Not reported.

B901—No. 2 engine oil pressure dropped to zero and engine backfired. Flames and black smoke seen coming from nacelle. Emergency cutoff valve was activated. CAUSE: Not reported.

B976—One engine backfired and lost power during ferry flight. CAUSE: Not reported.

C081—Transmission oil pressure dropped to zero and warning light came on. Oil temperature increased to 100°. CAUSE: Not reported.

C097—Crewmember noted excessive smoke coming from No. 1 engine. CAUSE: Engine oil scavenger line was chafed through by fire extinguisher ring. Oil sprayed over entire engine.

C130—Main gear box chip detector flashed after takeoff. Excessive collection of metal particles found on magnetic plug and oil screen. CAUSE: Suspect internal failure of gear box assembly.

C437—Pilot noted excessive vibration during hover prior to takeoff. CAUSE: Sheared bolt in pitch change beam assembly (FSN 1560-341-0787).

C533—No. 2 engine manifold pressure fluctuated and dropped to 22". CAUSE: Suspect impeller clutch failure.

C554—Main transmission oil pressure dropped and temperature rose. CAUSE: Suspect internal failure of main gear box assembly.

C574—Loud grinding noise heard from main transmission. CAUSE: Suspect transmission failure.

C813—Tail rotor intermediate gear box made noise and smoked. Input end of gear box disintegrated at touchdown. CAUSE: Failure of intermediate gear box assembly.

C958—No. 1 engine backfired. CAUSE: Suspect fouled spark plugs.

D039—No. 1 engine backfired and chip detector warning light came on. CAUSE: Not reported.

D071—No. 1 engine chip detector warning light came on. CAUSE: Chip detector malfunction.

D109—No. 1 engine backfired. CAUSE: Suspect fouled spark plugs.

D134—Transmission chip detector warning light came on. Metal particles found. Transmission replaced. CAUSE: Internal failure.

D637—Pilot noted oil leak. CAUSE: Failure of gaskets on exhaust and intake valve rocker box assemblies.

D784—Pilot noted vibration due to engine misfiring. Vibration increased after prelanding check.

CAUSE: Internal breakdown of spark plugs in No. 1 engine.

D848—No. 2 engine manifold pressure fluctuated three inches, then dropped to 21 inches. CAUSE: Impeller clutch failure.

D919—Pilot noted unusual vibrations. CAUSE: Loss of main rotor blade weights.

D936—Loud metallic noise heard from cabin area as helicopter was climbing through 6,000 feet, 20 minutes after takeoff. Main transmission chip detector warning light came on. Pilot autorotated to island and landed with power. Grinding noise heard from transmission during shutdown. Magnetic plug showed excessive deposits of metal particles. CAUSE: Not reported.

E170—Flight engineer discovered hot bearing in tail rotor drive shaft during inflight check. CAUSE: Bearing malfunction.

E770—Main rotor transmission chip detector warning light came on. Small metal particles found on plug. CAUSE: Not reported.

E850—Pilot heard grinding sound. Large metal particles found on main transmission magnetic plug. CAUSE: Suspect transmission failure.

E941—Landing gear indicator would not give down and locked indication. CAUSE: Maladjusted indicator.

F230—No. 1 engine backfired. CAUSE: Carburetor air bellows blew back into carburetor.

F313—No. 2 engine lost power and No. 1 engine backfired. CAUSE: No. 1 engine carburetor air bellows blew air back into carburetor. Cause of power loss not reported.

F404—No. 1 engine backfired. Spark plugs of No. 18 cylinder showed damage and metal particles were found on oil screen. CAUSE: Not reported.

F469—Helicopter was on a ferry flight at 1,000 feet when a loud noise was heard and the pilot experienced an extreme left yaw. The pilot maintained directional control and landed at the first suitable field. CAUSE: Suspect ASE malfunction.

G162—Transmission oil pressure dropped. CAUSE: Clogged oil passage, due to corrosion preventative and sealing coating which flaked off and contaminated oil.

G277—Helicopter was in cruise flight in instrument weather when the No. 3 tail rotor drive hanger bearing overheated and started smoking. Helicopter emerged VFR while pilot was calling ATC. Pilot cancelled IFR flight plan and landed. CAUSE: Failure of No. 3 tail rotor drive bearing assembly.

G623—Fuel leak developed during flight. CAUSE: Failure of fuel line to oil dilution system.

G773—No. 1 engine lost power and backfired continuously during landing approach. CAUSE: Failure of No. 16 cylinder.

G997—No. 1 engine ran rough and smoked. CAUSE: Failure of No. 12 cylinder push rod and housing.

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